



**Workshop on
Iron – phosphorus interactions and opportunities for
phosphorus stewardship**
13-14 July, 2020 (online)

Day 1 = Monday 13th July

14.00 Welcome. Workshop objectives and organisation – ESPP and co-organisers (*10 mins*)

14.10-16.00 Session 1 – Iron phosphorus interactions in natural and engineered systems

- Thilo Behrends – Challenges for trapping and recycling phosphorus from agricultural run-off: Introduction to the P-TRAP project (*10 mins*)
Additional input (2 mins / 2 slides maximum):
 - Stefan Jansen, Deltares – Use of iron sand in agricultural drain systems to prevent P run-off
 - Hui Xu, Ghent University – Reducing P losses from drained agricultural fields using iron-coated sand filters
 - Hans Chr. Bruun Hansen, University of Copenhagen – Iron oxide filters for agricultural P
 - Changyong Lu, University of Copenhagen – Magnetic MgFe LDH composites for phosphate removal - is the LDH sufficiently stable?

- Lena Heinrich, Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) – Iron phosphate coupling in wastewater treatment plants and lake sediments (*10 mins*)
- Caroline Slomp, Utrecht University – Fe/P relationship in marine environments (*10 mins*)

- Jean-Christophe Ades, Kemira for INCOPA – Use of iron and aluminium coagulants in wastewater treatment: P- removal and challenges of P- recovery (*10 mins*)
Additional input (2 mins / 2 slides maximum):
 - Denise Roberts, LKAB Minerals – The source of iron coagulants – magnetite
 - Derrick Emms, Sustainable Water Company – Removal of PO₄ from wastewater effluent using ferric from mine water and water treatment stations

- William Schipper – Overview of industrial applications & markets for iron phosphates (*10 mins*)
Additional input (2 mins / 2 slides maximum):
 - Alexandre Wavreille, Prayon – Industrial applications of iron phosphate
 - *Questions and discussion*

16.00 Wrap-up and close of Day 1



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Day 2 = Tuesday 14th July

10.00 Session 2 – Iron phosphate in agriculture

- Bengt Hansen, Kemira – How iron in sewage biosolids and recovered fertiliser products impact crop P availability (10 min)
- Cinta Cazador, Fertiberia – The specific case of recovered vivianite as fertilizer (10 min)
Additional input (2 mins / 2 slides maximum):
 - Kees Langeveld, ICL for Fertilizers Europe – Impacts of iron on phosphate fertiliser performance and implications for phosphate recycling from sewage (2 min)
 - Antonio Delgado, University of Sevilla – Iron phosphate as fertiliser on Mediterranean soils?
- Erik Smolders, Catholic University of Leuven – Iron in soil and plant phosphorus availability (10 min)
- Guy Kirk, Cranfield – How iron in soil impacts root P uptake and soil nutrient biochemistry (10 min)
Additional input (2 mins / 2 slides maximum):
 - Ruben Sakrabani, Cranfield University – Role of P analytical methods and their implications for evaluating P availability in crops
- Jon Lloyd, University of Manchester – Microbial and mineralogical constraints on Fe(III) bioreduction, and links to the phosphorus cycle

12.30 LUNCH BREAK

13.30 Poster session

Virtual poster session with five PhD students from the H2020 [P-TRAP](#) project. 5 min presentations followed by 5 min questions, the session is finished with a short general discussion.

- Victoria Barcala, Utrecht University – Capturing phosphorus in drained agricultural area
- Lordina Eshun, University of Manchester – Formation of vivianite in bioreactors
- Tolulope Ayeyemi, University of Sevilla – Suitability of P containing Fe phases as fertilizers
- Karel As, Bayreuth University – Lake restoration based on Fe addition
- Rouven Metz, University of Vienna – Biogeochemical mechanisms influencing the bioavailability of P and Fe from vivianite

14.30 BREAK



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15.00 Session 3 – Strategies for phosphorus release and recovery from iron phosphates

- Marie-Line Daumer, INRAE Rennes – Biologic routes for release of phosphorus from iron or aluminium compounds in sewage sludges (10 min)
- Leon Korving, Wetsus and Philip Wilfert, IPP Kiel – Vivianite formation and recovery from sewage sludge using magnetic separation or sulphide release (15 min)

Additional input (2 mins / 2 slides maximum):

- Carlo Belloni, Wetsus – Improved recovery of phosphate through manipulation of iron phosphate chemistry using Mössbauer spectroscopy
- Sarah Bluteau, McGill University (Canada) – Phosphorus recovery from FeP with sodium sulphide in biosolids (Ottawa municipal WWTP)
- Lisbeth Ottosen, DTU, Denmark – Separation of phosphorus from sewage sludge ash by electrolysis (10 min)
- Simon Kellmann, GEH Wasserchemie – Regeneration of phosphate-loaded granular ferric hydroxide and P-recovery from regeneration-solutions (10 min)

Impact of iron on industrial P-recovery processes

- Ludwig Hermann, Proman and ESPP President – overview of different process routes (5 min)
Flash presentations of different processes, with the emphasis on how iron impacts the process and whether the P-content bound to iron can be recovered (2 mins / 2 slides maximum):
 - Jürgen Eschment, Parforce – Phosphoric acid recovery from phosphorus-containing materials
 - Ángel Galinda Carbajo, ZAR/Technicas Reunidas - Dealing with iron with Phos4life Technology
 - Alfred Edlinger, MITechnology – FerroPhos process
 - Cristoph Ponak, University of Leoben – Desorption of P from Fe-containing liquid metal during reduction of sewage sludge ashes
 - Siegfried Klose, EuPhoRe – Recovery of phosphorus bound to iron in sludge

17.00 Wrap-up and closure